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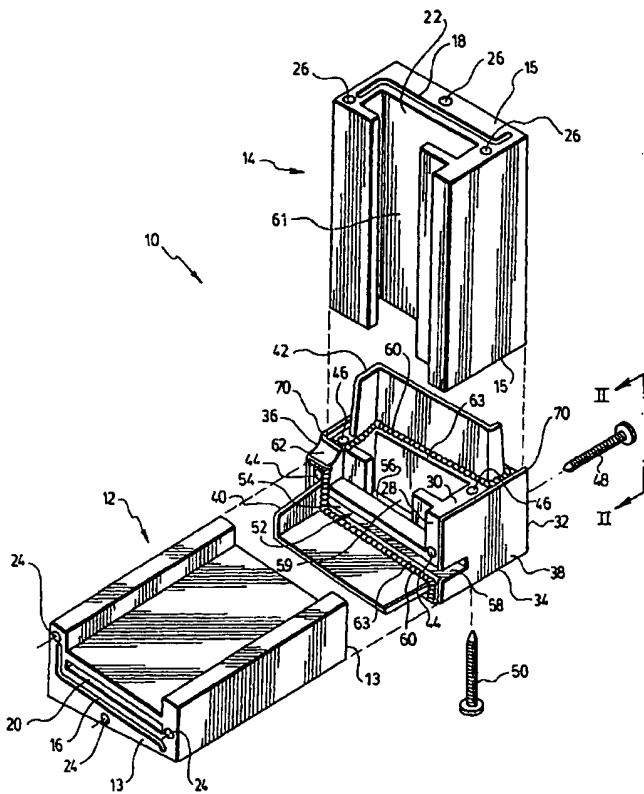
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**(54) Title: CORNER KEY FOR CONNECTING PROFILES TOGETHER AND FRAME WORK ASSEMBLY**



**(57) Abstract:** A corner key (10) for connecting profiles (12, 14) together and a frame work assembly formed of such corner keys (10) and profiles (12, 14). Each profile (12, 14) has an anchoring channel (16, 18), a drainage and venting passage (20, 22) and a securing bore (24, 26). The corner key (10) has two adjacent inner corner faces (28, 30), two adjacent outer corner faces (32, 34), and opposite inner and outer side corner faces (36, 38). Tabs (40, 42) on the inner corner faces (28, 30) guide the coupling of the profiles (12, 14). Fasteners (48, 50) are inserted through the outer corner faces (32, 34) in corner key bores (44, 46) and in the bores (24, 26) of the profiles (12, 14). A drainage and venting passage (52) in the corner key (10) communicates with the drainage and venting passages (20, 22) of the profiles (12, 14).

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## CORNER KEY FOR CONNECTING PROFILES TOGETHER AND FRAME WORK ASSEMBLY

### FIELD OF THE INVENTION

5 The present invention relates to a corner key for connecting profiles together and also to a frame work assembly that includes such corner keys and profiles.

### BACKGROUND OF THE INVENTION

Corner keys and lineal profiles are well known in the art, particularly in the context 10 of windows and doors. A lineal profile in this context designates either a sash profile or a frame profile. A corner key is used to connect the sash or frame profiles together.

As it is known in the art, a sash element in the context of windows forms the 15 mobile and working portion of a window. The sash element forms a perimeter called a sash frame that holds the necessary working hardware to allow the sash to slide, pivot, tilt, lock, etc. The sash element also includes the assembly of glazing and the edge-surrounding sash profiles. Sash profiles include top and bottom horizontal rails, and vertical stiles. A sash in the context of doors is most 20 commonly referred to as a panel.

In the manufacture of a conventional sash or frame assembly, one typically starts with lineal profiles. These profiles are designed to incorporate specific functional features and to show a certain aesthetic.

25 Furthermore, although many materials of construction are conventionally utilized for the manufacturing of sash elements, such as wood and aluminum, presently available insulating window units that utilize a sash element formed of polyvinyl chloride polymers (PVC) are known to provide superior insulating properties.

30 A frame in the context of both windows and doors designates the fixed structural assembly portion of a window or a door. The frame in this context is used for

example as a means of anchoring a window to a building. The frames contain mobile sashes and hold fixed glazing. Similarly as for sash elements, frame elements are typically made of PVC, but other materials, such as wood or aluminum, may be used as well.

5

Window frames and doorframes, are commonly made of four mainframe profiles. In a typical window frame, the top frame profile is usually identified as the header, the bottom one as the sill and the remaining two as the side jambs.

10 PVC window fabrication primarily involves the use of mitre-jointed corners. Accordingly, sash or frame profiles have their ends cut at an angle in order to form such mitre joints. Producing mitre joints requires great consistency in maintaining the shape of the profiles and a high degree of precision in cutting at the correct angle. Thus, very precise cutting equipment must be used to this effect. Once cut, 15 the mating ends of the profiles are joined together and a corner key can be used to align and reinforce the mitre joint.

The following documents disclose mitre cut profiles that are connected with a corner key:

<u>US Patents</u>	<u>Inventors</u>
4,240,765	OFFTERDINGER
4,453,855	RICHTER et al.
6,047,514	VERCH
6,073,412	VERCH
6,108,997	BLAIS et al.

20

<u>Foreign Patent</u>	<u>Inventors</u>
EP-0,611,871	BLANPIED

A disadvantage of producing mitre joints is that they require relatively expensive cutting equipment to make them. Such equipment also requires a larger working area and also more highly skilled labour.

25

It is also known in the art to use frame profiles that are straight cut. Most wood and aluminum profile assemblies commonly use butt-jointed corners, usually without corner keys. However, these assemblies require very complex machining preparation.

5

The following documents disclose butt-jointed profiles that also use a corner key to create the joint:

<u>US Patents</u>	<u>Inventors</u>
4,296,587	BERDAN
4,502,260	MACHLER
4,570,406	DIFAZIO
4,856,230	SLOCOMB
5,431,211	GUILLEMET
5,473,853	GUILLEMET et al.
5,485,705	GUILLEMET
5,547,011	DOTSON et al.
5,921,051	HOPE
5,960,605	HOPE
6,067,760	NOWELL
6,134,857	HOPE

10 Typically, as disclosed in US Patent No. 6,067,760 (NOWELL) for example, one end of the corner key is inserted inside a profile. A screw is then driven in an outer face of the profile and through the corner key to prevent them from disengaging from each other.

15 This technique of using perpendicular fastener insertion for joining together a profile to its corner key is satisfactory only when using certain types of materials, such as aluminum or pultrusion profiles. However, perpendicular fastener insertion through thermoplastic (PVC) profiles is not satisfactory because of the low tear resistance of such materials.

20 US patent No. 5,105,581 (SLOCOMB, Jr.) discloses a corner key that is only temporarily connected to a header by means of screws inserted longitudinally in a

screw boss of the header. No screw is longitudinally or axially inserted along the jambs. These screws temporarily hold the header to the corner key before an ultra-sound welding operation permanently secures the frame profiles to the corner key. This technique is disadvantageous in that the frame profiles are to be 5 secured to the corner key in two steps, thus increasing manufacturing time. Furthermore, there is no compression at all the interfaces of the profiles and the corner key that ensures a tight contact between them.

10 Korean utility model 1996-0068593U (LEE) discloses a corner key that is exclusively connected to profiles by means of axial screws. The corner key has openings that allow the insertion from the outside of reinforcement metals through the corner key and the profiles, after these are connected together, so as to prevent the phenomenon of bending of plastic frames.

15 None of the above mentioned documents address the problem of the possibility of water and air leakage through the joints between the profiles and the corner keys, nor any description of preventive measures to preclude such leakages. Furthermore, none of the above listed documents mention the use of corner keys, profiles and frame work assemblies in a context besides windows and doors.

20 Accordingly, there exists a need in the market for a relatively inexpensive frame work assembly having corner keys and profiles that can be tightly fitted to each other, with their joints being well sealed to avoid leakage problems.

25 Besides tight fitting and well sealed joints, it is known in the art to use a barrier system in the design, which is named the "Pressure-Equalized Rain-Screen Principle". This known principle is based on an outer "water-shed" barrier, in combination with a continuous, inner air barrier, whilst the air chamber between these two barriers has to be in communication with the outside ambient air 30 pressure. To achieve the latter condition, openings to the outside have to be created in the sill profiles of sashes and frames. Furthermore, any accumulation of water within the sash and frame profile cavities has to be evacuated through such

openings as well. The preparation of such openings requires special equipment and affords extra labour.

There is therefore also a need in the market for a relatively inexpensive frame  
5 work assembly that could incorporate the pressure equalization and rain screen principle.

#### SUMMARY OF THE INVENTION

It is an object of the present invention to provide a corner key and a frame work  
10 assembly that can overcome the prior art deficiencies and shortcomings.

It is another object of the present invention to provide a corner key for connecting two or more profiles together and forming a frame work assembly in a simple, yet reliable manner with a minimal effort and low manufacturing costs.

15 According to the present invention, there is provided a corner key for connecting two or more profiles together, each profile having an end face, a longitudinal drainage and venting passage and a longitudinal securing bore, the corner key comprising:

20 first and second adjacent inner corner faces, first and second adjacent outer corner faces opposite to the inner corner faces, and opposite inner and outer side corner faces extending between the inner and outer corner faces, the inner corner faces being shaped for respective coupling with the profiles;

25 first and second guide arrangements having a tab projecting on one of the inner corner faces and the end faces of the profiles, and an accommodating anchoring channel in the other one of the end faces of the profiles and the inner corner faces, the tab being shaped for fit engagement into the accommodating anchoring channel;

30 first and second bores each extending between a different one of the outer corner faces and one of the inner corner faces opposite to the one of the outer corner faces, the bores being in registration with the securing bores of the profiles when the profiles are coupled with the corner key;

first and second fasteners respectively insertable in the bores of the corner key and the profiles in a locking arrangement in which the corner key and the profiles are connected together; and

5 a drainage and venting passage extending between the first and second inner corner faces, the drainage and venting passage having opposite end openings in registration with the drainage and venting passages of the profiles when the profiles are coupled with the corner key.

According to another aspect of the present invention, there is also provided a  
10 frame work assembly comprising:

a) two or more lineal profiles, each having an end face, a longitudinal drainage and venting passage and a longitudinal securing bore; and

b) one or more corner keys, each corner key for connecting the two or more profiles together, each corner key having:

15 first and second adjacent inner corner faces, first and second adjacent outer corner faces opposite to the inner corner faces, and opposite inner and outer side corner faces extending between the inner and outer corner faces, the inner corner faces being shaped for respective coupling with the profiles;

20 first and second guide arrangements having a tab projecting on one of the inner corner faces and the end faces of the profiles, and an accommodating anchoring channel in the other one of the end faces of the profiles and the inner corner faces, the tab being shaped for fit engagement into the accommodating anchoring channel;

25 first and second bores each extending between a different one of the outer corner faces and one of the inner corner faces opposite to the one of the outer corner faces, the bores being in registration with the securing bores of the profiles when the profiles are coupled with the corner key;

30 first and second fasteners respectively insertable in the bores of the corner key and the profiles in a locking arrangement in which the corner key and the profiles are connected together; and

a drainage and venting passage extending between the first and

second inner corner faces, the drainage and venting passage having opposite end openings in registration with the drainage and venting passages of the profiles when the profiles are coupled with the corner key.

- 5 Preferably, the tabs project respectively from the first and second inner corner faces of the corner key for fit engagement into the accommodating anchoring channels in the end faces of the profiles, and the bores of the corner key are located adjacent to the tabs of the corner key.
- 10 Preferably, the outer side corner face has a water evacuation and pressure equalization vent in communication with the drainage and venting passage of the corner key and the drainage and venting passage of each profile.

15 Preferably, the corner key and profiles are made of polyvinyl chloride polymers (PVC).

20 Preferably, the first and second inner corner faces respectively comprise first and second recesses located adjacent to the tabs, and the recesses are provided with a sealing element sealing the corner key with the profiles when the profiles are coupled to the corner key.

25 Preferably, the inner and outer side corner faces comprise extension fins for masking joints between the side corner faces and the profiles when the profiles are coupled to the corner key.

30 The invention as well as its numerous advantages will be better understood by reading of the following non-restrictive description of a preferred embodiment made in reference to the appending drawings.

#### 30 BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a perspective exploded view of a corner key and profiles according to a preferred embodiment of the present invention;

Figure 2A is a cross sectional partial view at line II-II of Figure 1 showing a screw, corner key and profile before assembly, and wherein the corner key is provided with a recess without its sealing bead, according to a preferred embodiment of the present invention;

Figures 2B is a cross sectional partial view of the screw, corner key and profile of Figure 2A after assembly, according to a preferred embodiment of the present invention;

Figure 3A is a cross sectional partial view at line II-II of Figure 1 showing a screw, corner key and profile before assembly, and wherein the corner key is provided with a sealing bead in a recess, according to a preferred embodiment of the present invention;

Figure 3B is a cross sectional partial view of the screw, corner key and profile of Figure 3A after assembly, according to a preferred embodiment of the present invention;

Figure 4 is a perspective view of a corner key with an arrow showing water evacuation, according to a preferred embodiment of the present invention; and

Figure 5 is a perspective view of a corner key with arrows showing air pressure equalization, according to a preferred embodiment of the present invention.

#### 25 DETAILED DESCRIPTION OF THE INVENTION

Referring to Figure 1, there is shown a corner key 10 according to a preferred embodiment of the present invention. Also shown are portions of two profiles, one corresponding to a sill 12 and the other to a jamb 14 that are to be connected together by means of the corner key 10 to form part of a window frame assembly.

Those skilled in the art will understand that although only two window frame

profiles 12, 14 are illustrated, the teachings according to the present invention are also applicable to any number of profiles or to any other general purpose profiles that are to be jointed with a corner key. In particular, it will be understood that the present teachings apply not only to window frames, but also to door frames, and

5 to other similar structural assemblies as well.

The corner key 10 that is illustrated is preferably used as a right side lower corner key, but those skilled in the art will also understand that this corner key 10 can be modified so that it can also be used in another position of the frame, as will be

10 described below.

The profiles 12, 14 that are to be used with the corner key 10 can be made from various materials and by means of different techniques. For example, the profiles 12, 14 can be made of extruded aluminum, steel, brass or other metals.

15 Alternatively, the profiles 12, 14 can be formed by means of pultruded plastics, thermoplastics, such as PVC, or thermoset plastics. It is to be understood, however, that other suitable materials and techniques may be used to make these profiles as is well known in the art.

20 As shown, each profile 12, 14 that is to be connected to the corner key 10 preferably has three types of apertures that are apparent on the end faces 13, 15 of each profile 12, 14. These apertures include a longitudinal anchoring channel 16, 18, a longitudinal drainage and venting passage 20, 22 and one or more longitudinal securing bores 24, 26. It is advantageous to form these apertures

25 during the fabrication of these profiles 12, 14 so as to diminish the costs of production. In the case of, for example, a lineal extrusion process, these apertures are easily created when forming each profile 12, 14. One could also create these apertures later on, but this would increase manufacturing processing times and ensuing costs.

30

The longitudinal anchoring channels 16, 18 do not need to extend all the way across each profile 12, 14, but rather can take the shape of a recess with a

predetermined depth as will be described below. Furthermore, the anchoring channels 16, 18 could also be replaced with tabs as will be described below.

Preferably, the corner key 10 has a generally three-dimensional rectangular shape  
5 with two adjacent inner corner faces 28, 30, two adjacent outer corner faces 32, 34, and opposite inner and outer side corner faces 36, 38 extending between the inner and outer corner faces 28, 30, 32, 34. Similarly as explained in relation with the profiles 12, 14, the corner key 10 may be made according to different techniques and from different materials. For example, it can be formed, cast or  
10 molded by using metals, thermoplastics or thermoset plastics.

The inner corner faces 28, 30 are shaped for respective coupling with the profiles 12, 14, preferably with flat portions thereof matching those of the straight cut profiles 12, 14. Of course, it will be understood that the corner key 10 may have  
15 shapes other than a generally rectangular one, depending on the particular application or preferred design. For example, the corner key could be polygonal, such as hexagonal, or have any suitable shape, such as curvilinear, as long as it can be properly connected to appropriately shaped profiles. Furthermore, the corner key 10 of the present invention may be modified so as to be able to  
20 connect more than two profiles together as it will be apparent to those skilled in the art.

In the illustrated embodiment, the corner key 10 has two tabs 40, 42 that project respectively from the inner corner faces 28, 30. These tabs 40, 42 are shaped for  
25 fit engagement into the anchoring channels 16, 18 of the profiles 12, 14. It is preferable that the longitudinal anchoring channel 16, 18 of each profile 12, 14 and respective tabs 40, 42 have matching shapes in order to facilitate fit engagement of the tabs 40, 42 into the anchoring channels 16, 18. As illustrated, the tabs 40, 42 and the anchoring channels 16, 18 may have matching L or S  
30 shapes. It is also preferable that the tabs 40, 42 be tapered so as to further facilitate their fitting into the anchoring channels 16, 18. The tabs 40, 42 are preferably continuous in shape and extend along the inner corner faces 28, 30

starting from close to the edge of the inner side corner face 36 towards the outer side corner face 38, as illustrated. Additional tabs (not shown) may also project from the inner corner faces 28, 30 if more than two profiles are to be used with a single corner key. Of course, the tabs may have different designs than those 5 illustrated herein, if desired. Preferably, the tabs 40, 42 have a continuous shape extending lengthwise between the inner and outer side corner faces 36, 38.

It should also be understood that the guide arrangement formed of the tabs 40, 42 and channels 16, 18 as described above can be modified according to design 10 preferences. For example, profile tabs may project from the end faces 13, 15 of the profiles 12, 14 in replacement of the anchoring channels 16, 18, while the inner corner faces 28, 30 may be provided with channels or recesses that receive these profile tabs. It is also contemplated that the tabs may be removable, thus consisting in separate pieces from both the corner key 10 and profiles 12, 14. 15 Indeed, in such a configuration both the end faces 13, 15 of the profiles 12, 14 and the inner corner faces 28, 30 could then be provided with channels or recesses for receiving portions of these removable tabs.

Furthermore, even though the tabs 40, 42 are shown to be at a right angle from 20 each other, this does not necessarily have to be the case for all designs. Indeed, the tabs 40, 42 may also form acute or obtuse angles with each other.

The corner key 10 that is illustrated may be used in rectangular frame work assemblies, however a modification of the angles between the inner and outer 25 corner faces 28, 30, 32, 34 and/or tabs 40, 42 can be made so as to obtain differently shaped frames works, such as triangular shapes or rhomboid shapes with acute and obtuse angles.

The corner key 10 illustrated has multiple bores 44, 46, each extending between a 30 different one of the outer corner faces 32, 34 and one of the inner corner faces 28, 30 opposite to the one of the outer corner faces 32, 34. In the corner key 10 that is illustrated, the bores 44, 46 are non-intersecting because of the kind of fastener (a

screw) that is used, but this need not be the case as it will be further explained below. Furthermore, only one bore 44, 46 may extend across each of the inner corner faces 28, 30 and outer corner faces 32, 34. However, if desired, and for increased rigidity, several bores 44, 46 may extend across each of the inner 5 corner faces 28, 30 and outer corner faces 32, 34. In the illustrated example, the corner key 10 has three bores 44, 46 extending across each of the inner corner faces 28, 30 and outer corner faces 32, 34.

As it will be appreciated, when the profiles 12, 14 are inserted into the tabs 40, 42 10 of the corner key 10, the bores 44, 46 are in registration with the respective securing bores 24, 26 in the profiles 12, 14.

In order to create a stable and durable locking arrangement between the corner key 10 and the profiles 12, 14, a set of fasteners 48, 50 are respectively inserted 15 in the bores 44, 46 of the corner key 10 and the securing bores 24, 26 of the profiles 12, 14. Preferably, the fasteners 48, 50 are metal screws but any other type of fastener may be used for the purpose of locking the corner key 10 to its profiles 12, 14. For example, the fastener may be a serrated metal rivet, a bonded rivet or a fusion welded rivet. In another embodiment of the invention, the fastener 20 may be a certain type of adhesive glue or sealer that hardens inside the bores 44, 46 of the corner key and the securing bores 24, 26 of the profiles 12, 14. In that particular case, and as already mentioned above, the bores 44, 46 need not to be non-intersecting with each other. Alternatively, an ultrasound weld may also be used instead of the adhesive.

25

In the illustrated example, three screws 48 are inserted in the bores 44 of the corner key 10 from the outer corner face 32 and into the securing bores 24 of profile 12. Similarly, three screws 50 are inserted in the bores 46 of the corner key 10 from the outer corner face 34 and into the securing bores 26 of profile 14. It is 30 to be understood, however, that in another embodiment of the invention, only a single screw can be inserted from each of the outer corner faces 32, 34, into the bores 44, 46 and securing bores 24, 26. These bores would then be preferably

located in the middle of the corner key 10.

The fasteners 48, 50 are solely responsible for the permanence of the frame work assembly (not shown) that can be built. The axial or longitudinal insertion of the 5 fasteners 48, 50 relative to the profiles 12, 14 assures an intimate contact between the cut end faces 13, 15 of the profiles 12, 14 and the mating inner corner faces 28, 30 of the corner key 10. A sealing element, such as a foamed hot-melt sealing bead 60, in addition to the fasteners 48, 50 may assist in the permanence of the frame work assembly. The sealing beads 60 provide the 10 corner key 10 with long-lasting sealing properties to intimately seal the interfaces between the lineal profiles 12, 14 and the corner keys.

The corner key 10 is also provided with a drainage and venting passage 52 extending between the first and second inner corner faces 28, 30. This drainage 15 and venting passage 52 has opposite end openings 54, 56 in registration with the drainage and venting passages 20, 22 of the profiles 12, 14 when these are coupled with the corner key 10. As it will be further explained below with reference to Figures 4 and 5, the purpose of the drainage and venting passage 52 in the corner key 10 and the drainage and venting passages 20, 22 in the profiles 12, 14 20 is to allow water and air to flow therethrough. The drainage and venting passage 52 of the corner key 10 acts as an opening for pressure equalization within the rain screen principle discussed above.

The sealing element can also include silicone or a solid sealant such as 25 preformed or stamped foam gaskets. In addition to reinforcing the permanence of the joint at the interface between the end faces 13, 15 of the profiles and the inner corner faces 28, 30 of the corner key 10 as mentioned above, this sealing element eliminates possible water leaks from the drainage and venting passage 52 dripping into the wall cavity surrounding a window or a door frame, for example.

30

Preferably, the sealing element, such as the foamed hot-melt sealing bead 60, is applied onto the inner adjacent corner faces 28, 30 for sealing the drainage

channel 52 of the corner key with those of the profiles 12, 14 when the profiles 12, 14 are coupled to the corner key 10.

It is also preferable that the inner corner faces 28, 30 of the corner key 10 be 5 provided with strategically positioned sealing recesses 63 located adjacent to the base of the tabs 40, 42, where they meet the inner corner faces 28, 30 of the corner key 10. The sealing recesses 63 are shaped to receive and contain the sealing bead 60, and preclude it from dripping when it is laid therein. As illustrated, the sealing bead 60 is preferably laid along a continuous line adjacent 10 to each of the tabs 40, 42 and the drainage and venting passage 52.

Preferably, the bores 44, 46 of the corner key 10 are located adjacent to the tabs 40, 42 of the corner key 10. In this manner, the screws 48, 50 are strategically positioned, adjacent to the critical contact line formed by the tabs 40, 42 and the 15 sealing beads 60.

Referring to Figures 2A and 2B, there is shown an alternative embodiment of the present invention wherein no sealing bead 60 is applied in the between the corner key 10 and profile 12. However, the inner corner face 28 is still provided with the 20 sealing recess 63 that is formed of a sloped wall surface 68 on the inner corner face 28. This sloped wall surface 68 assists in the action of wedging the lineal profile 12 into the sealing recess 63.

Referring to Figures 3A and 3B, there is shown the same configuration as in 25 Figure 2A and 2B, but with the sealing bead 60 being applied in the sealing recess 63, for further enhancing the sealing feature of the design.

Preferably, and as is best illustrated with reference to Figures 1, 2A, 2B, 3A and 3B, the inner and/or outer side corner faces 36, 38 have extension fins 70 for 30 masking the joints 72 that are created between the corner key 10 and the profiles 12, 14, when the profiles 12, 14 are coupled to the corner key 10. In other words, the inner and outer side corner faces 36, 38 can be extended to overlap the plane

of contact between the cut faces 13, 15 of the profiles 12, 14 and the designated contact inner corner faces 28, 30 of the corner key 10. The added feature of such face extensions is the structural overlapping and the visual masking of the assembly joint 72 between the cut end faces 13, 15 of the lineal profiles 12, 14 and the corresponding faces of the corner key for the purpose of covering up irregularities of the profiles' 12, 14 end-cuts 13, 15, of guiding the application of the sealing bead 60, and of masking any sealing bead overflow. The extension of corner surfaces for the purpose of overlapping the assembly joint 72 can be applied to other surfaces of the corner key 10, particularly to those which remain exposed to the eye after the completion of installation of an assembled window or door.

Advantageously, the extension fins 70 provided on the inner and outer side corner faces 36, 38 may also form part of the sloped wall surface 68 of the sealing recess 15 63 provided on the inner corner faces 28, 30.

Furthermore, those skilled in the art will understand, the corner key 10 may be provided without any sealing recesses 63 and sealing beads 60. Such a configuration may be advantageous because it is easier and less expensive to 20 make. However, when a sealing bead is applied between the corner key and the profile, there may be leakage problems as there is not enough sealant mass to compensate for irregular contact faces and/or gaps created by distortion and by movement of contact surfaces at the joints.

25 Referring to Figures 4 and 5, there is shown another embodiment of the present invention showing a corner key 10 that is similar to the one shown in Figure 1. As mentioned above, the corner key 10 that is illustrated in Figures 1, 4 and 5 is preferably used as a right-side lower corner key because its outer side corner face 38 is provided with a water evacuation vent 58 that is in communication with the 30 drainage and venting passage 52 of the corner key 10 and the drainage and venting passage 22, 20 of each profile 12, 14 when these are coupled together. As those skilled in the art will understand, upper corner keys do not need to be

provided with such vent 58.

In use, when water infiltrates into the drainage and venting passages 20, 22 of the profiles, such as in case of rain or high humidity, this configuration allows for water

5 evacuation through the vent 58. It is preferable that the vent 58 and the drainage passage 52 have substantially flush bottom surfaces declining toward the outer side corner face 38. This downward slope facilitates the water evacuation as depicted by arrow and water drop 64.

10 As shown in Figure 5, the corner key 10 with its vent 58 also has the advantage of providing pressure equalization between the inside of the profiles 12, 14 and the ambient air outside, as depicted by arrow 66.

15 Preferably, the drainage and venting passage 52 has an opening 59 in one of the inner corner faces 28, 30. In the illustrated example, the opening 59 is on the inner corner face 30, above the end opening 54 of the drainage and venting passage 52. The corresponding profile 14 also has its drainage and venting passage 22 provided with an opening 61 that communicates with the opening 59. These openings 59, 61 are provided so that sashes or any component of a frame 20 can be inserted therein, as those skilled in the art will understand.

25 Advantageously, the inner and outer side corner faces 36, 38 can bear logos, trademarks, information or decoration designs for advertisement, publicity and/or decoration purposes. Also, the inner side corner face 36 may have a chamfered and rounded corner 62 extending between the inner corner faces 28, 30. A chamfered and rounded corner may also be provided between the outer corner faces 32, 34. The chamfered and rounded corner 62 provides a design that may be appealing, and which is visible on an assembled sash or window frame.

30 Use of the corner key of the present invention eliminates the need for expensive production equipment and large floor space, and therefore provides a cost efficient solution for the fabrication of window or door frame assemblies in

particular, but also for general purpose frame work assemblies.

Furthermore, the frame work assembly according to the present invention eliminates the need for mitre-cuts, welding and weld cleaning, nor is any

5 punching, routing or drilling needed since all operational functions of a complete window or door assembly are incorporated into the corner keys. It also allows the use of unskilled labor due to the simplicity of its assembly process.

An advantage of the present invention is that the pressure equalization and water

10 evacuation openings are provided as an integral part of the design of the corner keys, thus eliminating the need for the otherwise required additional machining effort.

The frame work assembly of the present invention may be used for the creation of

15 windows having any type of operation, such as fixed, horizontally and vertically sliding, inward and outward projecting, etc.

The frame work assembly may also be used for the creation of doors of any type of operation, such as sliding, inward and outward projecting, etc.

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Although the present invention has been exemplified with frame profiles, those skilled in the art will understand that the present teachings are also applicable to sash profiles.

25 Furthermore, although the profiles are mainly used in the context of a window or door frame assembly, those skilled in the art will understand that the corner key and profiles of the present invention may be used to assemble such diverse frame work assemblies as walls of a building, a container, or any general purpose structure or frame work assembly.

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Although a preferred embodiment of the present invention has been described in detail herein and illustrated in the accompanying drawings, it is to be understood

that the invention is not limited to this precise embodiment and that various changes and modifications may be effected therein without departing from the scope or spirit of the present invention.

## WHAT IS CLAIMED IS:

1. A corner key for connecting two or more profiles together, each profile having an end face, a longitudinal drainage and venting passage and a longitudinal securing bore, the corner key comprising:
  - 5 first and second adjacent inner corner faces, first and second adjacent outer corner faces opposite to the inner corner faces, and opposite inner and outer side corner faces extending between the inner and outer corner faces, the inner corner faces being shaped for respective coupling with the profiles;
  - 10 first and second guide arrangements having a tab projecting on one of the inner corner faces and the end faces of the profiles, and an accommodating anchoring channel in the other one of the end faces of the profiles and the inner corner faces, the tab being shaped for fit engagement into the accommodating anchoring channel;
  - 15 first and second bores each extending between a different one of the outer corner faces and one of the inner corner faces opposite to the one of the outer corner faces, the bores being in registration with the securing bores of the profiles when the profiles are coupled with the corner key;
  - 20 first and second fasteners respectively insertable in the bores of the corner key and the profiles in a locking arrangement in which the corner key and the profiles are connected together; and
- 25 a drainage and venting passage extending between the first and second inner corner faces, the drainage and venting passage having opposite end openings in registration with the drainage and venting passages of the profiles when the profiles are coupled with the corner key.
- 30 2. The corner key according to claim 1, wherein the tabs project respectively from the first and second inner corner faces of the corner key for fit engagement into the accommodating anchoring channels in the end faces of the profiles.
- 35 3. The corner key according to claim 2, wherein the tabs form a right angle with each other.

4. The corner key according to claim 2, wherein the tabs form acute or obtuse angles with each other.
5. The corner key according to claim 1, wherein the outer side corner face has a water evacuation and pressure equalization vent in communication with the drainage and venting passage of the corner key and the drainage and venting passage of each profile.
- 10 6. The corner key according to claim 5, wherein the vent and the drainage and venting passage of the corner key have substantially flush bottom surfaces declining toward the outer side corner face.
- 15 7. The corner key according to claim 2, wherein the bores of the corner key are located adjacent to the tabs of the corner key.
8. The corner key according to claim 2, wherein the tabs have tapered ends facilitating fit engagement into the anchoring channels.
- 20 9. The corner key according to claim 8, wherein the tabs and the anchoring channels have matching shapes further facilitating fit engagement of the tabs into the anchoring channels, and wherein each of the tabs has a continuous shape.
- 25 10. The corner key according to claim 2, wherein the first and second inner corner faces form a right angle with each other and the first and second outer corner faces form a right angle with each other.
- 30 11. The corner key according to claim 1, wherein the first and second inner corner faces are provided with a sealing element sealing the corner key with the profiles when the profiles are coupled to the corner key.
12. The corner key according to claim 2, wherein the first and second inner

corner faces respectively comprise first and second sealing recesses located adjacent to the tabs, the sealing recesses receiving a sealing element sealing the corner key with the profiles when the profiles are coupled to the corner key.

5        13. The corner key according to claim 12, wherein the inner and/or outer side corner faces comprise extension fins for masking joints created between the inner and/or outer side corner faces and the profiles when the profiles are coupled to the corner key.

10        14. The corner key according to claim 2, wherein the fasteners comprise screws or rivets.

15        15. The corner key according to claim 2, wherein the fasteners comprise an adhesive matter or an ultrasound weld.

16. The corner key according to claim 12, wherein the first and second inner corner faces have substantially flat surface portions, and the sealing recesses have sloped wall surface portions.

20        17. The corner key according to claim 2, wherein the corner key is made of thermoplastic material or metal.

25        18. The corner key according to claim 2, wherein the inner and/or outer side corner face has a chamfered and rounded corner extending between the inner corner faces.

30        19. The corner key according to claim 2, wherein the drainage and venting passage of the corner key has an opening in one of the inner corner faces above the end opening of the drainage and venting passage of the corner key in said one of the inner corner faces.

20. The corner key according to claim 2, wherein the outer side corner face

has a water evacuation and pressure equalization vent in communication with the drainage and venting passage of the corner key and the drainage and venting passage of each profile.

5        21. The corner key according to claim 20, wherein the first and second inner corner faces respectively comprise first and second sealing recesses located adjacent to the tabs, the sealing recesses receiving a sealing element sealing the corner key with the profiles when the profiles are coupled to the corner key.

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22. The corner key according to claim 21, wherein the inner and/or outer side corner faces comprise extension fins for masking joints created between the inner and/or outer side corner faces and the profiles when the profiles are coupled to the corner key.

15

23. The corner key according to claim 20, wherein the fasteners comprise screws or rivets.

20        24. The corner key according to claim 20, wherein the drainage and venting passage of the corner key has an opening in one of the inner corner faces above the end opening of the drainage and venting passage of the corner key in said one of the inner corner faces.

25        25. The corner key according to claim 1, wherein the inner or outer side corner faces bear logos, trademarks, information or decorations.

26. A frame work assembly comprising:  
a) two or more lineal profiles, each having an end face, a longitudinal drainage and venting passage and a longitudinal securing bore; and  
30        b) one or more corner keys, each corner key for connecting the two or more profiles together, each corner key having:  
first and second adjacent inner corner faces, first and second

adjacent outer corner faces opposite to the inner corner faces, and opposite inner and outer side corner faces extending between the inner and outer corner faces, the inner corner faces being shaped for respective coupling with the profiles;

5        first and second guide arrangements having a tab projecting on one of the inner corner faces and the end faces of the profiles, and an accommodating anchoring channel in the other one of the end faces of the profiles and the inner corner faces, the tab being shaped for fit engagement into the accommodating anchoring channel;

10      first and second bores each extending between a different one of the outer corner faces and one of the inner corner faces opposite to the one of the outer corner faces, the bores being in registration with the securing bores of the profiles when the profiles are coupled with the corner key;

15      first and second fasteners respectively insertable in the bores of the corner key and the profiles in a locking arrangement in which the corner key and the profiles are connected together; and

20      a drainage and venting passage extending between the first and second inner corner faces, the drainage and venting passage having opposite end openings in registration with the drainage and venting passages of the profiles when the profiles are coupled with the corner key.

27. The frame work assembly according to claim 26, wherein the tabs project respectively from the first and second inner corner faces of the corner key for fit engagement into the accommodating anchoring channels in the end faces of the profiles.

25

28. The frame work assembly according to claim 27, wherein the tabs form a right angle with each other.

30      29. The frame work assembly according to claim 27, wherein the tabs form acute or obtuse angles with each other.

30. The frame work assembly according to claim 26, wherein the outer side corner face has a water evacuation and pressure equalization vent in communication with the drainage and venting passage of the corner key and the drainage and venting passage of each profile.

5

31. The frame work assembly according to claim 30, wherein the vent and the drainage and venting passage of the corner key have substantially flush bottom surfaces declining toward the outer side corner face.

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32. The frame work assembly according to claim 27, wherein the bores of the corner key are located adjacent to the tabs of the corner key.

33. The frame work assembly according to claim 27, wherein the tabs have tapered ends facilitating fit engagement into the anchoring channels.

15

34. The frame work assembly according to claim 33, wherein the tabs and the anchoring channels have matching shapes further facilitating fit engagement of the tabs into the anchoring channels, and wherein each of the tabs has a continuous shape.

20

35. The frame work assembly according to claim 27, wherein the first and second inner corner faces form a right angle with each other and the first and second outer corner faces form a right angle with each other.

25

36. The frame work assembly according to claim 27, wherein the first and second inner corner faces are provided with a sealing element sealing the corner key with the profiles when the profiles are coupled to the corner key.

30

37. The frame work assembly according to claim 27, wherein the first and second inner corner faces respectively comprise first and second sealing recesses located adjacent to the tabs, the sealing recesses receiving a sealing element sealing the corner key with the profiles when the profiles are coupled to

the corner key.

38. The frame work assembly according to claim 37, wherein the inner and/or outer side corner faces comprise extension fins for masking joints created  
5 between the inner and/or outer side corner faces and the profiles when the profiles are coupled to the corner key.

39. The frame work assembly according to claim 27, wherein the fasteners comprise screws or rivets.

10

40. The frame work assembly according to claim 27, wherein the fasteners comprise an adhesive matter or an ultrasound weld.

15

41. The frame work assembly according to claim 37, wherein the first and second inner corner faces have substantially flat surface portions, and the sealing recesses have sloped wall surface portions.

42. The frame work assembly according to claim 27, wherein the corner key is made of thermoplastic material or metal.

20

43. The frame work assembly according to claim 27, wherein the inner and/or outer side corner face has a chamfered and rounded corner extending between the inner corner faces.

25

44. The frame work assembly according to claim 27, wherein the drainage and venting passage of the corner key has an opening in one of the inner corner faces above the end opening of the drainage and venting passage of the corner key in said one of the inner corner faces.

30

45. The frame work assembly according to claim 27, wherein the outer side corner face has a water evacuation and pressure equalization vent in communication with the drainage and venting passage of the corner key and the

drainage and venting passage of each profile.

46. The frame work assembly according to claim 45, wherein the first and second inner corner faces respectively comprise first and second sealing recesses located adjacent to the tabs, the sealing recesses receiving a sealing element sealing the corner key with the profiles when the profiles are coupled to the corner key.

47. The frame work assembly according to claim 46, wherein the inner and/or outer side corner faces comprise extension fins for masking joints created between the inner and/or outer side corner faces and the profiles when the profiles are coupled to the corner key.

48. The frame work assembly according to claim 45, wherein the fasteners comprise screws or rivets.

49. The frame work assembly according to claim 45, wherein the drainage and venting passage of the corner key has an opening in one of the inner corner faces above the end opening of the drainage and venting passage of the corner key in said one of the inner corner faces.

50. The frame work assembly according to claim 26, wherein the inner or outer side corner faces bear logos, trademarks, information or decorations.

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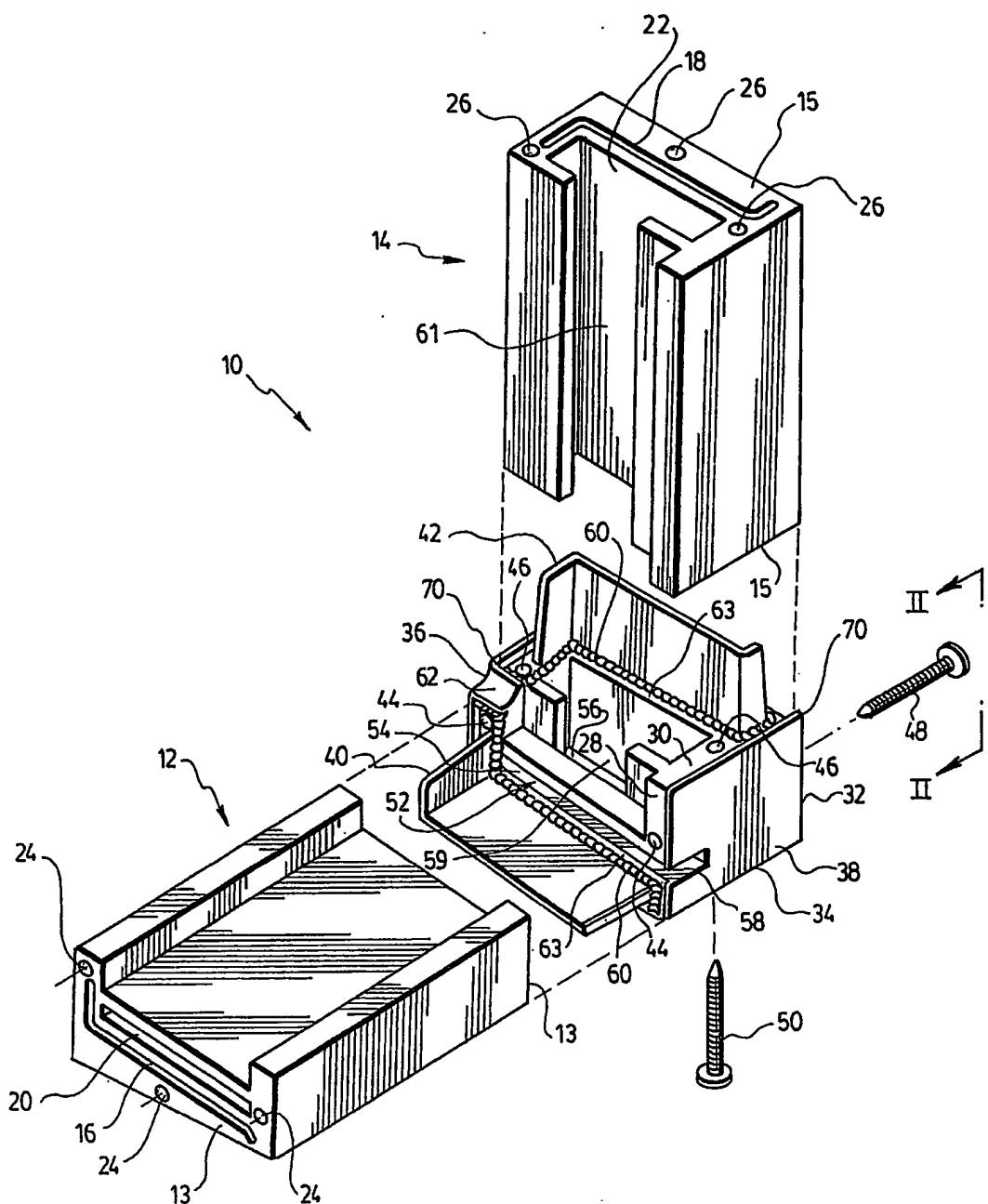


FIG. 1

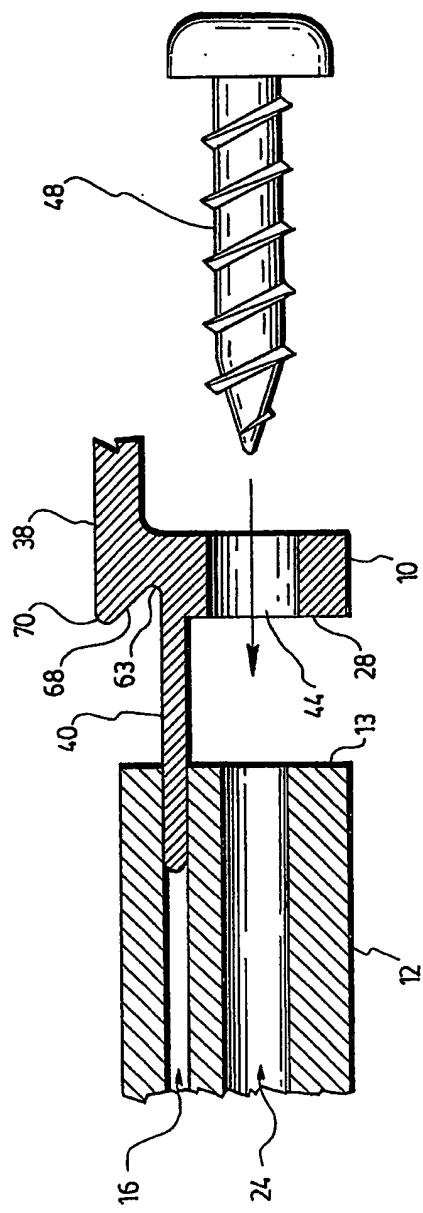


FIG. 2A

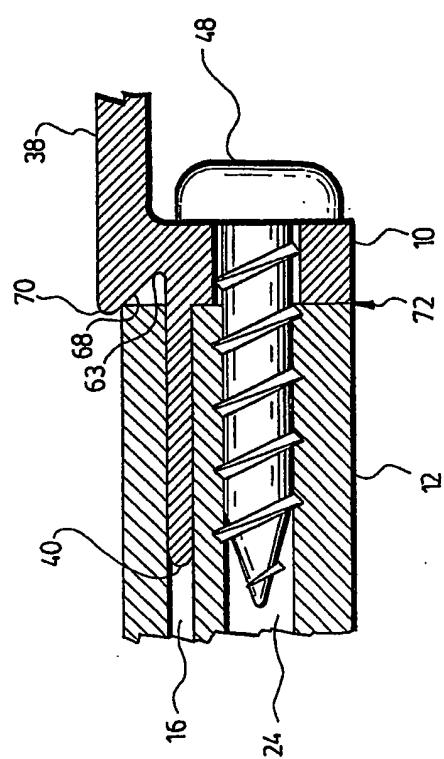


FIG. 2B

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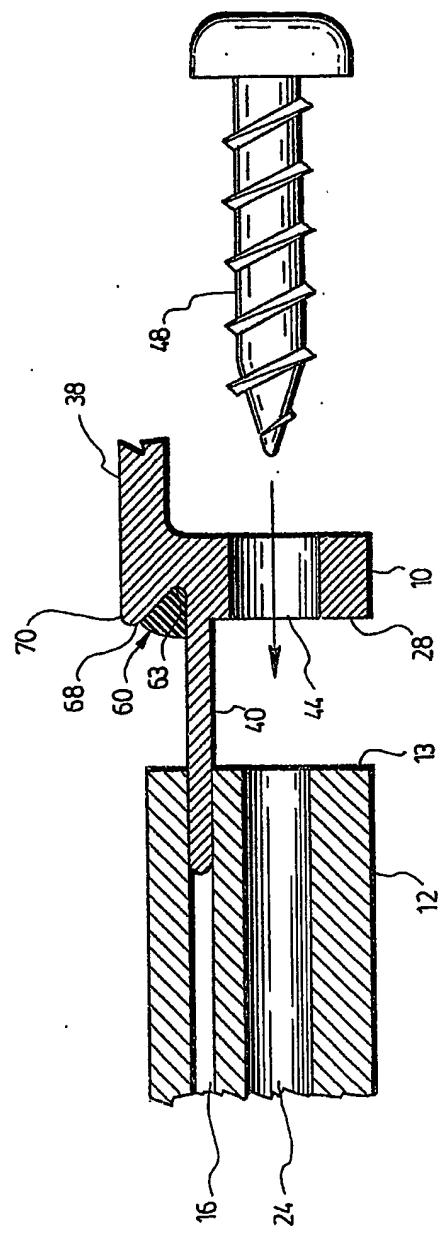


FIG. 3A

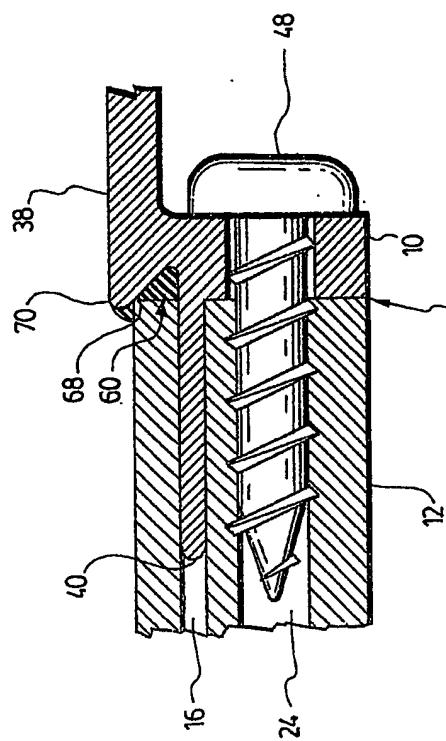


FIG. 3B

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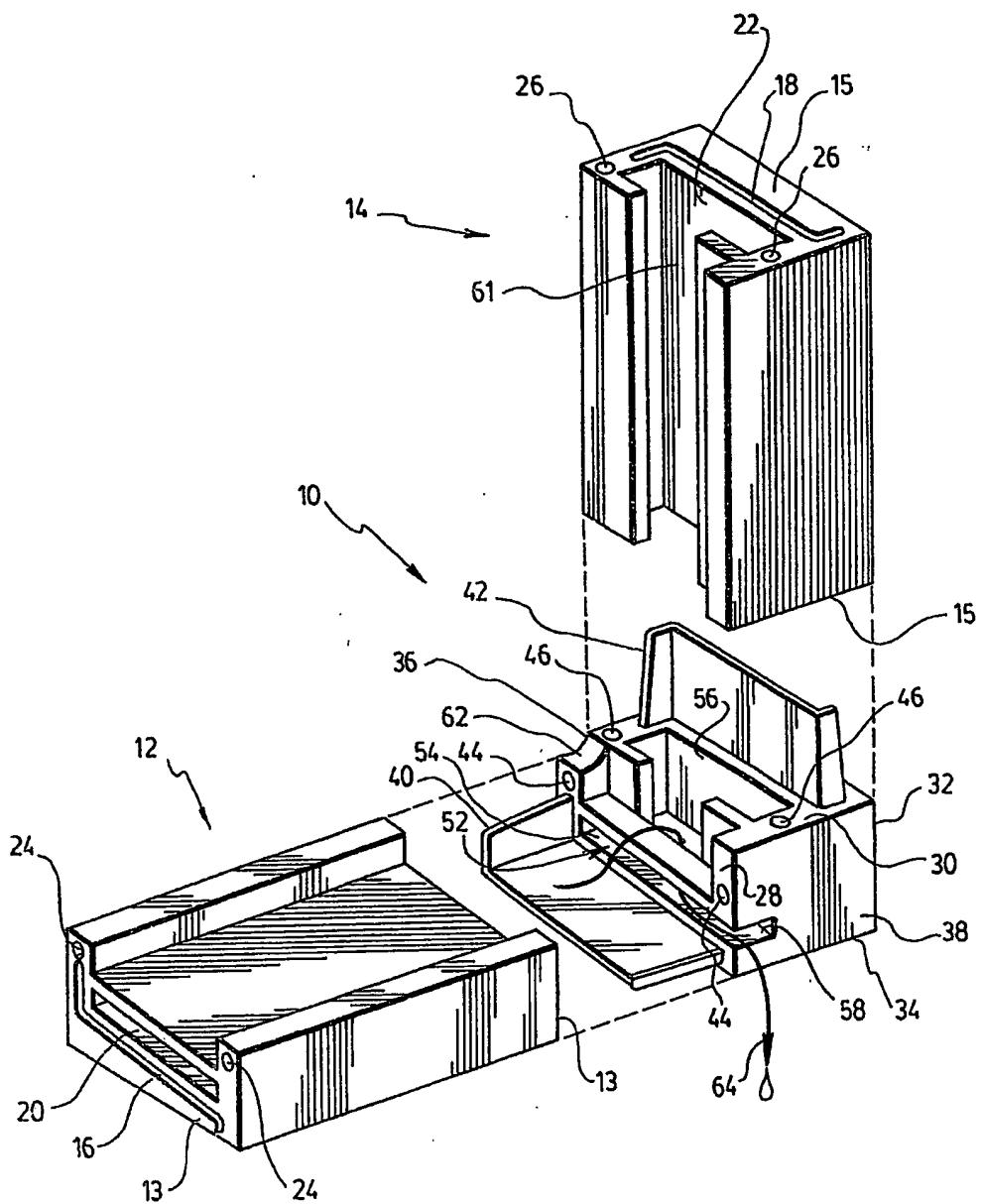


FIG. 4

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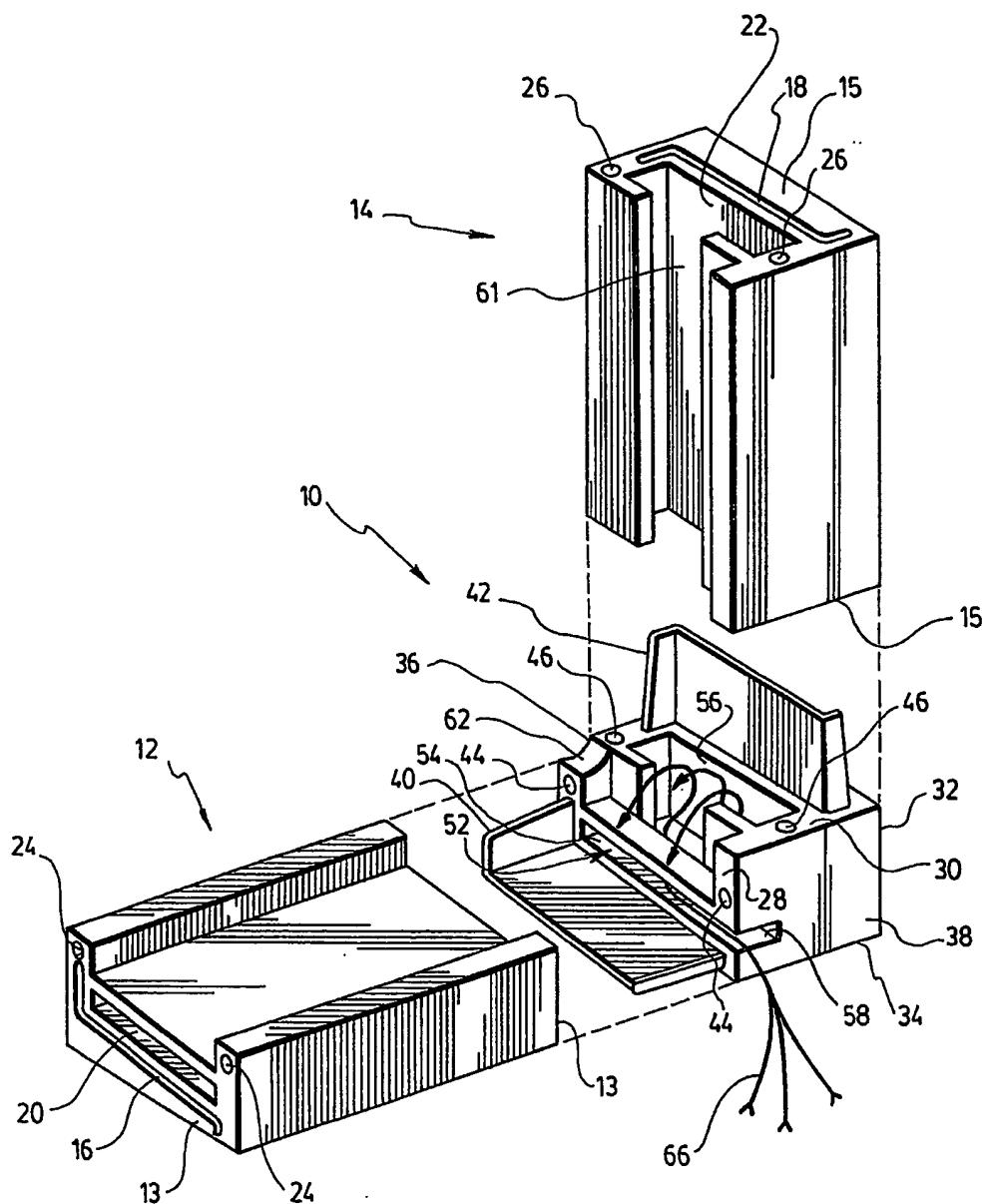


FIG. 5

## INTERNATIONAL SEARCH REPORT

International Application No  
PCT/CA 02/00041

**A. CLASSIFICATION OF SUBJECT MATTER**  
IPC 7 E06B3/96

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)  
IPC 7 E06B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 6 067 760 A (NOWELL JEFFREY A) 30 May 2000 (2000-05-30) the whole document —	1-3,10, 17,26
A	DE 195 09 657 A (WOLFARTH FRIEDRICH) 19 September 1996 (1996-09-19) the whole document —	1,2,14, 26
A	GB 2 159 864 A (GLOSTER PLASTICS LIMITED) 11 December 1985 (1985-12-11) the whole document —	1-3,26
A	GB 1 355 458 A (KUNSTSTOFF GMBH) 5 June 1974 (1974-06-05) the whole document —	1,26

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

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- \*O\* document referring to an oral disclosure, use, exhibition or other means
- \*P\* document published prior to the International filing date but later than the priority date claimed

- \*T\* later document published after the International filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
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Date of the actual completion of the International search

17 September 2002

Date of mailing of the International search report

26/09/2002

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## INTERNATIONAL SEARCH REPORT

Information on patent family members

National Application No

PCT/CA 02/00041

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